

CASE REPORT

Endovascular Forceps Assisted Stuck Catheter Removal: A Case Report

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Abstract

Despite the high degree of safety associated with image-guided central venous access placement, the increasing use of long-term central venous access devices has brought greater attention to the chronic complications these patients encounter, particularly in the hemodialysis patient population. The rare occurrence of a stuck catheter can create a challenging

situation in which the risk of removal and sometimes advanced techniques required must be weighed against the risk of infection and thrombosis associated with leaving the catheter in place. Removal of the stuck catheter through endovascular approach has been described by multiple techniques. The case presented is a successful stuck catheter removal through a novel technique by use of endovascular forceps following failure of other methods. Level of evidence: No level of evidence

Key Words: *Stuck Catheter; Central Venous Stenosis; Endovascular Forceps; Hong's Technique*

Introduction

Stuck catheter refers to the scenario in which a catheter cannot be removed by standard technique and requires endovascular or surgical intervention. The first report of a stuck catheter was described by a case report in 2005. Traction upon a tunneled dialysis catheter resulted in catheter fracture despite surgical dissection of the catheter from the subcutaneous tunnel down to the vein [1]. The authors postulated that the fracture was the result of firm adherence of fibrin sheath surrounding the catheter to the wall of the central veins, creating unanticipated tension during removal.

Many cases of stuck catheter have since been reported in the literature. One retrospective study reviewing a nine year period found an incidence of approximately 1% of all tunneled hemodialysis catheters stuck, requiring endovascular or surgical technique for removal [2]. Risk factors that have been attributed to the development of stuck catheter include longer indwelling time, female gender, pediatric patients, left internal jugular vein placement, and those with multiple line placements in the same vessel [3,4].

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Case Report

A 38-year-old man with end-stage renal disease and chronic central venous occlusion was referred to interventional radiology for removal of a left internal jugular tunneled dialysis catheter (TDC) following maturation of a newly placed, left-sided brachiocephalic AV fistula. A fistulagram was first performed, which identified complete occlusion of the patient's previously stented left brachiocephalic vein (Figure 1). The TDC remained functional, with its tip positioned centrally beyond the thrombosed segment.

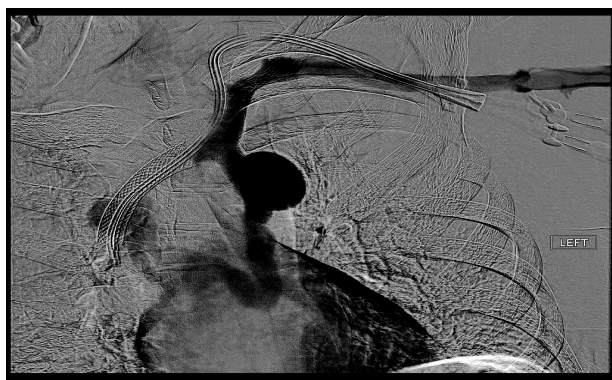


Figure 1) Central venogram demonstrates complete occlusion of a left brachiocephalic vein bare metal stent with collateral flow seen.

A wire was passed through the TDC, with the intent of catheter removal. Resistance was met as the catheter was pulled back with moderate force, resulting in tension on the mediastinal structures and pain for the patient. At this point, the decision was made to end the procedure so that cross-sectional imaging could be obtained prior to more aggressive catheter removal maneuvers.

CT of the chest showed near-complete occlusion of the left brachiocephalic stent by chronic appearing thrombus. The patient was brought back to IR for attempted catheter removal. Guidewires were placed through both of the catheter lumens and advanced into the IVC. Angioplasty was performed within both lumens throughout the length of the catheter using a 6 mm x 2 cm angioplasty balloon, however the catheter was unable to be freed. Next, an angled catheter and hydrophilic wire were passed alongside the TDC, through the existing subcutaneous tunnel and into the left internal jugular vein. The stent oc-

clusion was crossed with the hydrophilic wire. Angioplasty was then preformed alongside the stuck catheter using a 10mm balloon.

As the catheter was still unable to be removed, right femoral access was then obtained, and through-and-through wire access ("body floss") was achieved. An attempt was made to oversheath the catheter from below using a 16 French sheath, however this was unsuccessful due to adherence of the arterial limb of the catheter to the vessel wall.

A 3 mm shaft, 60 cm length endobronchial forceps (model 4162, Lymol Medical, Woburn, MA) was then advanced through the 16 French sheath. The forceps was used to dissect thrombus and scar tissue that surrounded the catheter. The catheter tip was then grasped with the forceps and pulled into the sheath from below (Figure 2). The sheath was then able to be advanced superiorly over the catheter just beyond the length of the stent. This freed the catheter, which was then removed from the IJ access site with ease (Figure 3).

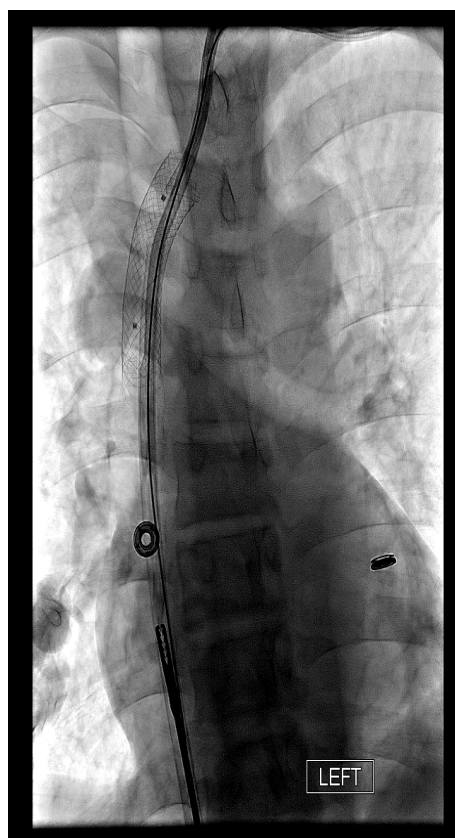


Figure 2) Endovascular forceps is seen grasping the tunneled dialysis catheter tip while the 16 Fr sheath was simultaneously advanced upwards over the catheter.

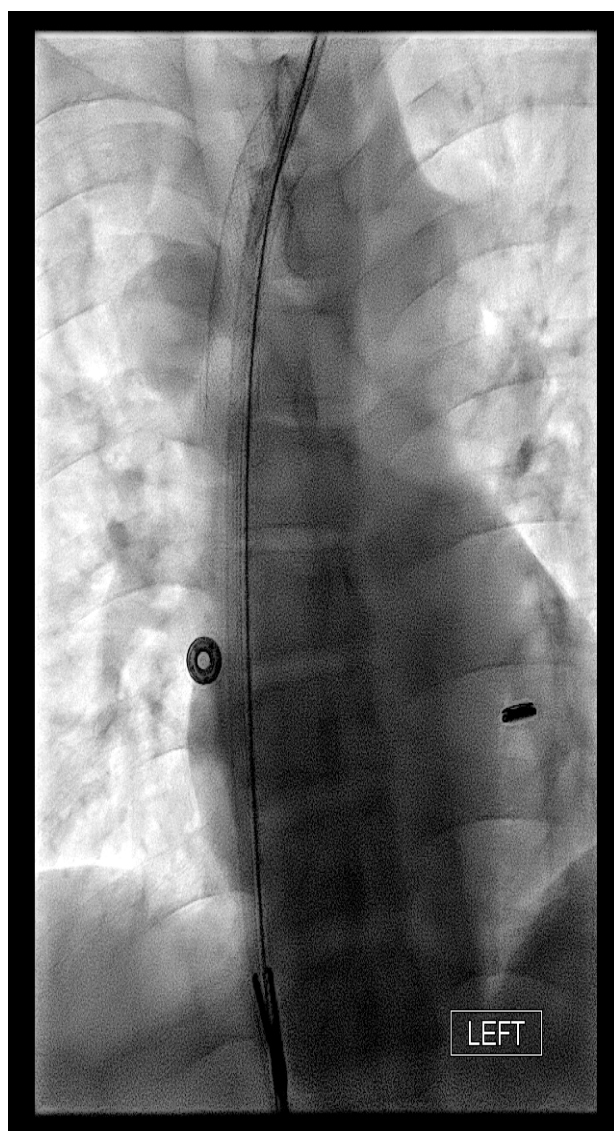


Figure 3) With the 16 Fr sheath passed beyond the occluded left brachiocephalic vein stent, the tunneled dialysis catheter was freed and able to be removed from above.

The patient tolerated the procedure without immediate complication and was discharged to home. However, two days later the patient presented to the emergency room with complaints of pleuritic chest and back pain. CT pulmonary angiography revealed acute subsegmental pulmonary emboli. A heparin drip was started, and the patient was admitted to the general medicine floor.

The patient's course was further complicated by development of a hemodynamically significant pericardial effusion. This was attributed in part to supratherapeutic anticoagulation, as it was not present on the CT pulmonary embolism study and only manifested after anticoagulation was started. Anti-

coagulation was held, and after pericardiocentesis removed 500cc of blood, there was improvement in his symptoms and hemodynamics. Pericardial drain output ceased and anticoagulation was resumed following recommendations from a hematology consult. The patient was discharged, and to date there have been no further complications or problems with dialysis access per chart review.

Discussion

Several endovascular techniques have been described for treatment of the stuck catheter, some of which work within the catheter lumens, while others work within the vessel but external to the catheter. The most commonly used technique involves the use of endoluminal balloon angioplasty, known as Hong's technique [5]. The original method described the use of 5 and 6 mm angioplasty balloons inflated along the entire length of the catheter, one lumen at a time. Others have subsequently reported successful results using slight alterations to Hong's technique [6,7]. One case series that examined 15 patients with stuck catheters treated by endoluminal angioplasty found a 100% success rate and no discernable complications associated with the procedure [8]. Less commonly described are a number of other techniques that aim to externally strip or oversheath the stuck catheter, from access parallel to it, from femoral access below, or a combination of both [4,9,10].

The use of forceps was decided upon only after other described methods had failed. There is a paucity of reports to advise the operator on how to proceed in such a situation. The case presented suggests that the use of endovascular forceps is a viable option when an adherent catheter is resistant to the more commonly employed methods.

Though this patient did experience post-procedural complications, the significance is difficult to fully ascertain given the circumstances. The subsegmental pulmonary emboli identified on CT are pre-

sumed to represent embolization of small amounts of thrombus and fibrin material dissected from the catheter, however it is uncertain if full anticoagulation is necessary in this scenario. Furthermore, the development of hemopericardium was confounded by the presence of a supratherapeutic INR. It is unknown whether a presumed injury to the pericardium as a result of blunt forceps dissection would be clinically apparent in the presence of a normal clotting cascade. What can be concluded is that if this technique is performed, it should be done judiciously and with special caution exercised in the post-procedural period.

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Conflicts of interest

The authors declare that they have no conflict of interest.

Ethical Approval

For this type of study formal consent is not required.

Informed Consent

For this type of study informed consent is not required.

Consent for Publication

Consent for publication was obtained for every individual person's data included in the study.

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